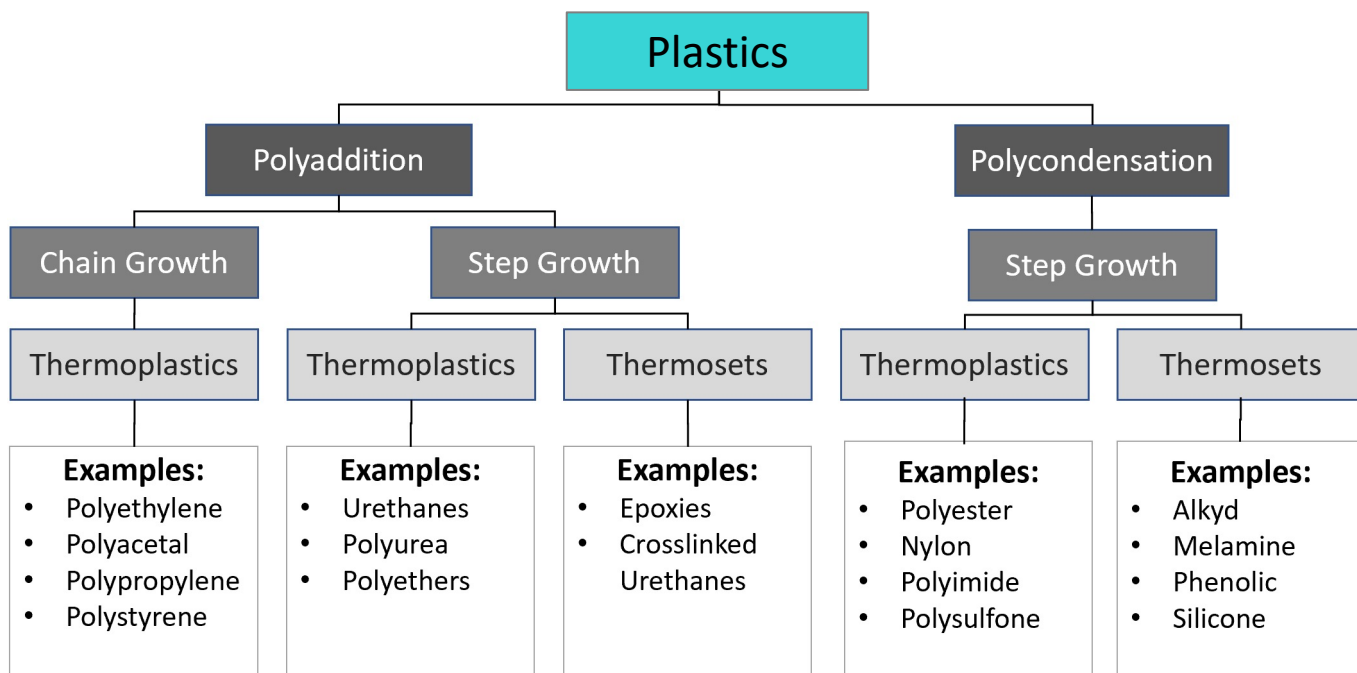


- Describe the structure and the bonding of polymers
- Explain why polymers are solid at room temperature

## Key Facts

Polymers are large molecules built by linking 50 or more smaller molecules called monomers  
Each repeat unit is connected to the adjacent units via **covalent bonds**



Monomer	Polymer	Polymer or Trade Name	Uses
<p>CH<sub>2</sub>=CH<sub>2</sub></p>	<p>~CH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>~</p>	polyethylene	Plastic bags, bottles, toys, electrical insulation.
<p>CH<sub>2</sub>=CHCH<sub>3</sub></p>		polypropylene	Carpeting, bottles, luggage, exercise clothing.
		polystyrene	Take-out trays, CD cases, foam-walled drink cups, moldable parts.
<p>CH<sub>2</sub>=CHCl</p>		Polyvinyl chloride	Bags for intravenous solutions, pipes, tubing, floor covering.
<p>CF<sub>2</sub>=CF<sub>2</sub></p>		Polytetrafluoroethylene (Teflon)	Non-stick coating for cooking utensils, Gore-Tex, chemically resistant specialty plastic parts.



- Describe the structure and the bonding of polymers
- Explain why polymers are solid at room temperature



**Polymers are produced from crude oil.**

Describe the structure and bonding in a thermosoftening polymer and explain why thermosoftening polymers melt when heated.

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**PEX is a material that is used as an alternative to copper for hot water pipes.**

**PEX is made from poly(ethene).**

(i) Describe how ethene forms poly(ethene).

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(ii) PEX is a shape memory polymer. What property does a shape memory polymer have?

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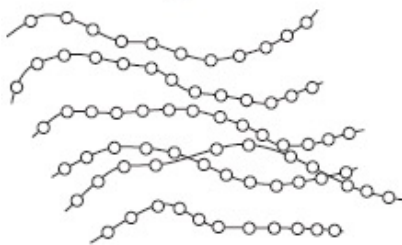
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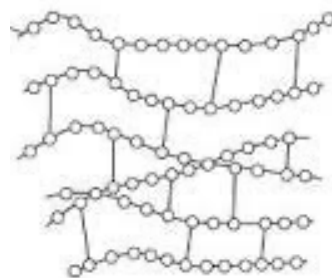
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(iii) The simplified structures of poly(ethene) and PEX are shown.

Polymer chains



Poly(ethene)



PEX

**Poly(ethene) is a thermoplastic that softens easily when heated.**

Suggest and explain how the structure of PEX changes this property.

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Some polymers are described as smart polymers. Suggest one property of a smart polymer that is different to that of an ordinary polymer.

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## KS4-17-07: Using Resources - Explore polymers

- Describe the structure and the bonding of polymers
- Explain why polymers are solid at room temperature



Explain how low density and high-density poly(ethene) are both produced from ethene.

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Explain the difference between thermosoftening and thermosetting polymers in terms of their structures.

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In the box below draw a product made from a polymer then explain how the properties of that material is related to their uses and select appropriate materials. Explain / show what would happen if the material was heated?